

NUH GEDIK

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SIMULTANEOUS VECTORIAL SPIN MAPPING OF A TOPOLOGICAL INSULATOR USING CIRCULARLY-POLARIZED TIME-OF-FLIGHT PHOTOEMISSION

We introduce a time-of-flight based angle-resolved photoemission spectroscopy using ultrafast circularly-polarized laser pulses that is capable of measuring vectorial spin distribution simultaneously over an entire volume of phase space. We apply this general technique to obtain spin maps over the complete surface band of a topological insulator Bi_2Se_3 . It is found that surface electrons behave as an ideal helical Dirac cone within a narrow energy range about the charge neutrality point, but acquire modulations in all three components of spin at higher energies relevant to device applications. I will also discuss how the pulsed nature of TOF-ARPES naturally lends itself to time-resolved imaging of band dispersions and spin-polarizations in electronic systems driven out-of-equilibrium.